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The Glass Industry
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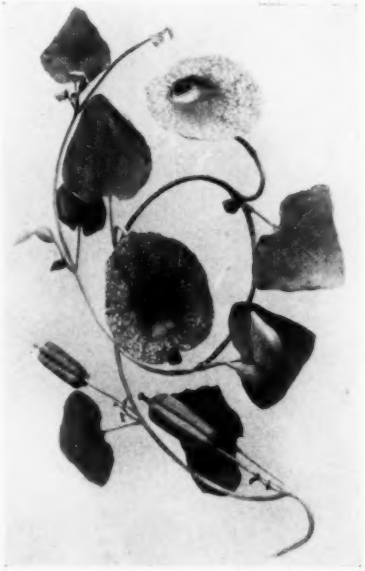
Vol. 15 JANUARY, 1934 No. 1

The Ware Collection of Blaschka Glass Models of Plants In Flower

By Courtesy of Harvard University

THE University has long possessed a valuable collection of woods, fibres, seeds, and other economic products. In some cases these specimens were accompanied by excellent drawings, photographs, and engravings of the useful plants from which the raw materials are derived. The specimens and the illustrations had been selected by Professor Asa Gray with characteristic care and therefore formed an excellent nucleus for a Museum of Botany, but, since pictures can represent only two dimensions, it appeared desirable to supplant them by a few models showing the plants in three dimensions. Diligent search, both in this country and abroad, showed that only models in paper-mache were obtainable, and these were exceedingly crude. Models in wax can only with difficulty be kept free from rust.



MODEL 378

It was at this point that Professor Goodale, then Director of the Botanic Garden, and Professor of Botany in Harvard College, conceived the idea of securing the services of the Blaschkas of Dresden, modellers in glass, to prepare if possible, glass-models of flowering plants, in natural colors. He therefore visited the artists in their home and studio in Germany, and solicited them to prepare a few reproductions of flowers, in the intervals of their engrossing work in making models of marine invertebrata. They declined to undertake the experiment. There happened to be, however, on the mantel in their reception-room, a few fine Orchids, which looked as if they had just been brought from a conservatory. When attention was called to these by the visitor, the artists explained that the Orchids were made of glass. It thus became plain that the artists could make models of plants. After some persuasion, they consented to attempt the production of a few plant models for Harvard University.

This collection was thus begun in 1886. It is the product of the activity of two naturalists, Leopold Blaschka and his son Rudolph, who have constructed all of these models without the aid of a single assistant of any kind. All of the modelling has been done by their own hands alone.

Leopold Blaschka, the founder of the art representing Natural History objects in colored glass, was born May 27th, 1822 at Aicha, a town in northern Bohemia. He was the youngest son of Joseph Blaschka, a mechanician in electrical apparatus, and an artificer in glass (workmanship in decorative glass being traditional in the originally Venetian family). After his early studies were completed, Leopold Blaschka began work as a goldsmith, devoting himself especially to the cutting and setting of precious stones, and to fine gold-work, in Turnau, Bohemia. After some years he returned to Aicha, where he engaged in metal and glass work with his father. in 1853, he made a voyage to the United States. During long calms in the voyage to and from New York, in a sailing vessel, he made many drawings of the marine invertebrata which he collected, and from them constructed in 1865 the first glass-models of coelenterata for the Natural History Museum at Dresden. The models at once attracted attention, and laid the foundation of a successful business which was limited only by Leopold's resolution to employ no apprentices or assistants except his son.

Rudolph, his son, was born June 17th, 1857, in Aicha, but was educated at Dresden. His taste for Botany and Zoology was encouraged by his teachers and by his father

BOTANICAL GLASS MODELS

MODEL 378
Aristolochia elegans
Aristolochia
Aristolochiacaea

MODEL 615
Thea sinensis
Tea
Theacceae

MODEL 58
Passiflara
Common Passion-Flower
Passfloroaceae

MODEL 673
Kalmia latifolia, typical form
Mountain Laurel
Ericaceae

FIG. 615

FIG. 58

and, when he was ready to become his father's assistant, after studies covering many years, he had made himself familiar with the fiora of Middle Germany and a large part of the marine fauna of the North Sea, the Baltic, and the Mediterranean. Glass-models of marine forms constructed by these naturalists are to be found in a large number of Museums, but glass-models of plants and flowers occur only in the Botanical Museum of Harvard University.

The Blaschkas secured, by good fortune, a suitable studio about a mile from the Royal Gardens, and greenhouses at Pilnitz on the Elbe, and these gardens, through the friendly offices of the Court, yielded all the exotics which could well be utilized at the outset. In the garden around the studio at Hosterwitz, were a good

FIG. 673

many cultivated American plants which could be grown out of doors in the climate of Saxony. From the Botanic Gardens at Dresden and Berlin many plants were obtained. But it soon became evident that a wider supply of material must be provided, and therefore arrangements were made to bring into the garden at the studio a larger number of tropical American plants. The plan was now definitely formed to illustrate the different natural families, using, as far as practicable, only American plants. As the plan developed, it became desirable to represent tropical plants under the best conditions. This could be done only by studies on the spot. In 1892 Mr. Rudolph Blaschka consented to come to America to prosecute studies of the plants of tropical America, and also of

our far West. He made sketches of the plants desired, made notes of colors, prepared specimens showing details; and of each species he made accurate microscopic drawings for subsequent modelling. Mr. Blaschka's journey carried him to Jamaica where he made extensive studies, and prepared a large collection for studio-work. Later, in company with Professor Ganong, he went to the Pacific Coast, where he collected many specimens, and made exhaustive analyses for his work at home. He carried to Germany a large series of tropical, desert, and California plants, besides obtaining many additional species from the Missouri Botanic Garden, St. Louis, and also from the Botanic Garden and Arboretum of Harvard University. A second journey was undertaken in 1895 to comprise studies in the southern states. Mr. Blaschka had made a collection of specimens in Virginia and farther south, when he was suddenly summoned home by news of the death of his father. Since his return to his studio he has carried on his work chiefly with material obtained on these two journeys and with many plants which have been placed at his disposal by botanical correspondents in Europe. Mr. Rudolph Blaschka has also given a good part of his time to the construction of models to illustrate the relations of insects to the fertilization of flowers. These models, exhibiting the insects and flowers of natural size, are supplemented by a series showing the same sorts of insects and flowers greatly enlarged.

All the specimens which have been made since 1895 are the artistic handiwork of Mr. Rudolph Blaschka, who has carried on all of his study and modelling single-handed in his studio in Germany. The fact that all of the models in these exhibition-rooms have been made by two artists without the aid of any assistants whatever, must be fully grasped to appreciate the magnitude of the achievement, far greater than any before attained in his special field.

The entire collection of models is the gift to Harvard University of Mrs. Elizabeth C. Ware and her daughter Miss Mary Lee Ware, of Boston, as a memorial to the late Dr. Charles Eliot Ware, of the Class of 1834.

An Oklahoma Bottle Plant

By Sherman J. Kline

MANY and varied are the elements which combine to account for the high quality of milk bottles manufactured in the spacious, completely-equipped and up-to-the-minute plant of the Liberty Glass Company at Sapulpa, Oklahoma—established 15 years ago and serving a wide clientele in the states which constitute the entire central area of the nation, from the Gulf to the Great Lakes and from east of the Mississippi to the Rockies.

In addition to well-nigh perfect control of the intricate manufacturing processes involved, through use of late model automatic machinery, not the least of this plant's numerous features are the careful and methodical checking of its products in a modern laboratory and the fact that the plant has unusual facilities for the production of its products.

Skilled laboratory technicians devote their time daily to painstakingly testing finished milk bottles selected at random from each lehr, giving special attention to color, brilliancy, strength, weight and measure tests for strength, being particularly thorough as a result of subjecting bottles to sudden and extreme temperatures of scalding water and to the application of great internal pressure.

Natural gas from the company's own wells furnishes fuel for firing Liberty's furnaces and to feed the huge gas engines to which are connected powerful dynamos that generate electrical energy for operating the high-speed machine units and lighting the plant throughout. When necessary, this source of inexpensive and efficient fuel is augmented by a supply of gas obtained from other wells located along the company's own lines. A battery of shallow wells provide the plant with an ample water supply.

Another building houses a mold shop where capable craftsmen, aided by up-to-date precision machinery and equipment, design and construct the various types and sizes of plain and lettered molds used in making milk bottles for many regular customers from far and near, thus assuring prompt and satisfactory service to patrons, while in still another structure—also a veritable hive of industry—workmen are busily engaged in making shipping crates. Lumber for this purpose, already sawed into the proper lengths, is obtained in carload lots from Arkansas and Louisiana, and at the Sapulpa plant nailing machines complete the job of turning out sturdy crates capable of withstanding the punishment of rough handling invariably encountered in long-distance shipping.

The Liberty Glass Company is one of the three original licensees of Hartford-Empire feeders and lehrs for milk bottles. The plant's largest furnace is of 60-ton capacity, operating four Miller milk bottle machines, while the smaller tank has a capacity of 20 tons and operates two Miller milk bottle machines.

Employees of the plant number 110 at this time, with three shifts of workmen steadily employed. Operating in full accord with the NRA, the plant personnel has recently been increased by 25 per cent.

As part of an expansion program which was begun several months ago in anticipation of increased business expected with the return of more prosperous times generally this fall, in June the Liberty concern purchased the plant of the Three Rivers Glass Company at Three Rivers, Texas, and moved the machinery from that plant to Sapulpa to amplify the equipment there.

Liberty maintains a staff of five traveling salesmen who contact jobbers and other large buyers of the firm's products throughout the wide territory served by the company.

Always a busy plant, Liberty reports a steady increase in volume since the first of June.

Officers of the Liberty Glass Company are: George F. Collins, president; Russell Davidson, vice-president and sales manager; C. J. Pfeffer, treasurer, and Frank P. Collins, secretary and plant superintendent.

Remarkable Exhibit of Illuminated Manuscripts

By Courtesy of the New York Public Library and Miss Belle da Costa Greene, Director, Pierpont Morgan Library.

Foreword by the Editor

THE decision to publish the above article in a publication devoted to Glass, with the included illustrations of examples of early paintings on parchment, was determined upon the fact that the designs, decorations and colors used by the consumate artists of ancient days, who with infinite pains created them, correspond very closely with those of the earlier stained glass in churches and other structures. (Any illustration in black, however, is sadly lacking in brilliance.)

This remarkable coincidence is called to the attention of glass workers throughout the world with the object of enlightening their minds on the mystery surrounding the creation of the infinitely beautiful painted manuscripts, which related mostly at that time to orthodox church services and duties, persons of royal descent, agriculture, sports and other subjects of interest to nations which had as yet no knowledge of the invention of printing processes or of the movable wooden types which were to be developed later

BEATUS—COMMENTARY ON APOCALYPSE—SPANISH, IX CENTURY

by the famous Englishman, Caxton and other lifelong devotees of the art of printing. Until that miracle occurred, the only available method of preserving the writings of ancient authors was by the unbelievably artistic designs and illuminations on some more or less perishable material such as parch-

HOURS OF YOLANDE DE SOISSONS—FRENCH, XIII CENTURY

ment, a practice which has persisted to this day in spite of considerable competition from other materials then and now available. This for a long time was the only reading matter accessible to the only partly-civilized populations of those days.

It seems desirable to acquaint as many glass designers and workers as possible with these facts in the hope that they will use all possible diligence and intelligence in an effort to attend the large and, to the uninitiated, the marvellous exhibition of illuminated manuscripts loaned to the New York Public Library by the private library of Pierpont Morgan, whose collection of such relics of ancient days is believed to be the largest extant. In addition to these examples there are two large hand-lettered illuminated books known as the Codex Sinaiticus, a Greek manuscript of the Old and New Testament of fourth century origin and of the greatest antiquity and value, which was found on Mount Sinai 1854.

The original copy of this remarkable production has recently been bought by the British government from the Soviet Government of Russia. Details of this transaction are given elsewhere in this issue.

The Codex Sinaiticus

THE Codex Sinaiticus is a Greek manuscript of the Old and New Testaments, of the greatest antiquity and value; it's fourth century origin is not questioned, though the possibility of an early fifth century date is conceded. The manuscript was found on Mount Sinai, in St. Catherine's Monastery, by Constantine Tischendorf. He was visiting there in 1844, under the patronage of Frederick Augustus; King of Saxony, when he discovered in a rubbish basket 43 leaves of the Old Testament. He was permitted to take them. He also saw other fragments of the same codex but could not obtain possession of them. Warning the Monks of their value, he left for Europe and two years later published the leaves he had brought with him under the name of Codex Friderico-Augustanus, after his patron. They are preserved in Leipzig. On a second visit in 1853 he found only two short fragments of Genesis (which he printed on his return) and could learn nothing of the rest of the codex. In 1859 he made a third visit, this time under the patronage of the Tsar, Alexander II. This visit seemed likewise fruitless, when, on the eve of his departure, in a chance conversation with the steward, he learned of the existence of a manuscript, and when it was shown to him,

DA COSTA HOURS—FLEMISH, XVI CENTURY

he saw the very manuscript he had sought for, containing, beyond all his dreams, a great part of the Old Testament and the entire New Testament, besides the Epistle of Barnabas, and part of the "Shepherd" of Hermas, of which two works no copies in the original Greek were known to exist. Thinking it "a crime to sleep" Tischendorf spent the night copying Barnabas; he had to leave in the morning,

(*Continued on page* 7)

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Glass-Making Is Now a Criminal Occupation

Things are getting worse for the glass industry and, particularly for the bottle making industry, as a result of recent litigation in broken bottle cases. The physical situation is, that a bottle containing a beverage under pressure, usually "soda" of some sort, breaks without apparent cause or sufficient cause, or is alleged to have so broken, and hurts a purchaser.

The legal situation has been that the injured party sues the beverage bottler, and joins the bottle manufacturer as a co-defendant, alleging negligence on the part of one or both defendants. In this fashion many bottle manufacturers have latterly found themselves promoted to membership in the Unenviable Brotherhood of Joint Tort-feasors.

A still more unpleasant situation arose recently in Pittsburgh where the injured plaintiff sued the bottling company alone, and the bottling company itself brought in the bottle manufacturer, specifically alleging that the bottle manufacturer made faulty bottles and that this was one of them. A careful examination of the bottle by some of the best technologists in the country, and by reputable and practical bottle makers, failed to disclose any manufacturing defect in the bottle, which seemed indeed to be a very fine product. The same conclusion was reached by the bottling company's own expert, and as the bottle had seen long service and been out of the control of the manufacturer a long time, there seemed no just reason for putting the manufacturer to any expense in the suit.

When the case came to trial, the plaintiff offered no evidence whatever (other than the broken bottle itself) that the bottling company was negligent, but merely sought to prove that an accident occurred without apparent cause, and that therefore there was an inference of negligence on the bottler's part. Not a word was said against the bottle manufacturer, and in fact the plaintiff's attorney attempted to prove by his own expert witness that the bottle was a good one. To this course the bottler objected, and a secret conclave of attorneys was held around the judge's bench, as a result of which the objection was sustained, and the witness dismissed.

The net result was that the plaintiff "rested" the case without impunging the bottle manufacturer in any way and without saying anything in favor of him. Plaintiff had also proved no negligence on the part of the bottler, and had merely inferred it on general grounds. She had not attempted to show what the cause of the "explosion" was, and had admitted that the bottle had been in her place of business for 2 1/2 hours.

Both defendants asked for a directed verdict in favor of defendants, and the judge, after urging on plaintiff that she produce at least some evidence of negligence, finally decided to let the case go to the jury. This is an exceedingly unpleasant precedent of which the glass industry and the bottling industry also, should at once take notice. Hereafter, if any bottle breaks and hurts someone, the burden is on the bottler and bottle manufacturer to explain why it breaks and to prove that they were innocent. This is getting dangerously near a reversal of the English common law view that a man is innocent till proved guilty: we now have a situation where bottlers and bottle manufacturers are considered guilty till they can prove themselves innocent.*

In this particular instance, the bottle manufacturer was discharged from the case on a technicality. The plaintiff never mentioned the co-defendant, and the defendant, who was responsible for bringing him in, forgot to do so. The defendant (bottler) took the position that as nothing had been offered in evidence against him, he could offer no counter evidence. He therefore "rested". The co-defendant thereon similarly "rested", and later in addressing the jury showed that there was no evidence even that the co-defendant made the bottle complained of. The judge then directed a verdict in favor of co-defendant, but the case against the bottler went to the jury.

The jury returned a verdict against the bottler for one thousand dollars, which is scarcely more than her alleged expenses, and indicate probably a desire to acquit the bottler of negligence and yet a desire to help a poor woman who has been hurt. The verdict itself is a moral victory for the bottler, but the dangerous precedent set by the judge calls for prompt counteraction.

The assumption that bottle manufacturers and bottlers are engaged in a criminal occupation and that they may be held guilty until they can prove themselves innocent is not an assumption that either industry can tolerate.

F. W. PRESTON

* The doctrine of res ipsa loquitur does not apply in Pennsylvania, and in permitting the case to go to the jury the judge made a distinction without a difference. The plaintiff's attorney had clearly prepared his case as if that doctrine did apply, and nothing can be more certain than that future prosecutors will do the same thing.

(*Continued from page* 5)

after failing to persuade the Monks to let him have the manuscript. At Cairo he stopped at a monastery belonging to the same Monks (they were of the Orthodox Greek Church) and succeeded in having the manuscript sent to him there for transcription; and finally, in obtaining it from the Monks, as a present to the Tsar Tischendorf's patron and the protector of their church. Tischendorf published an account of the manuscript in 1860; and under the auspices of

BOSTIANY–ENGLISH XII CENTURY

the Tsar printed it in quasi-facsimile in 1862, in four volumes. The following year he published a critical edition of the New Testament. Finally in 1867 he published additional fragments of Genesis and Numbers, which had been used to bind other volumes at St. Catherine's and had been discovered by the Archimandrite Parfirius.

Adapted from the Catholic Encyclopedia, 1908.

Plate Glass Production in November

The total production of polished plate glass by the member companies of the Plate Glass Manufacturers of America, as reported by Secretary P. A. Hughes, for the month of November 1933 was 4,169,442 sq. ft., as compared to 5,793,693 sq. ft. produced by the same companies in the preceding month, October, 1933, and 4,510,960 sq. ft. produced by the Association members in the corresponding month last year, November 1932.

Saving the Codex Sinaiticus

In speaking of the scanty December fifteenth payments on account, it is gratifying to note that the British Government is buying the famous Fourth Century Bible, the Codex Sinaiticus, for $509,250. It looks as if the diplomacy of Soviet Government was continuing to acquit itself creditably in the lists of international affairs.

Perhaps that section of the Thomas Amendment which permits the British and other debtor nations to pay part of their debt in silver might be enlarged now to include the permission for them to pay part of the debt in the form of the Codex Sinaiticus. As the years pass, and the necessity grows for forgiving our debtors, we shall need all of the biblical materials that the world affords, to sustain our fortitude.—(*See page* 8)

New Plate Glass Storage Building

Ground has been broken for construction of a new storage warehouse at the Libbey-Owens-Ford Glass Company's Roxford plant. The new structure will be built at a cost of $250,000. This warehouse is to be a brick and steel building, 144 by 348 feet. The construction contract was awarded to the A. Bentley & Sons Company. This new warehouse will provide for a very large storage of plate glass blanks and will tend to insure steady employment of workers since it permits a more continuous operation of the company's glass furnaces, irrespective of the normal fluctuation in customers' demands.

The Outlook for 1934

By GERARD SWOPE, *President, General Electric Company*

These are difficult times to prognosticate and possibly it is human to turn to past prophecies, especially when they have turned out fairly well. Last year I stated that the indices of use of power and revenue carloadings showed a continued upward trend and that therefore we were hopeful that this upward trend would continue. I am showing here the same indices continued through 1933 and it will be seen that for the quarter ended June 30, 1933 the three crossed the line have been distinctly upward since. The fourth quarter has gone down from the high point but is still better than for the same period in 1932..

Now with the codes of fair competition adopted in many of the industries, with the increased employment and increased purchasing power that has been brought about, these activities naturally and undoubtedly will cause some increase in prices to the ultimate consumer.

The problem of today is to have a greater revival in the capital goods industry, which has felt the increase but little, and with all the hopeful and constructive attitude being shown, we are looking forward with confidence that 1934 will be a better year than 1933 in employment and in industry. .

POSTSCRIPT: The note above appeared in Vol. 1 No. 10 December 30, issue of *Today*, the National Independent Weekly of which the distinguished Raymond Moley is Editor. Other prominent personages interested in the organization which publishes that live journal, are known as *Today Associates, Inc.* Included in the group are Vincent Astor, W. Averell Harriman, V. f. McNitt, Executive Editor, Mary H. Rumsey, Wiliam C. Stewart, Managing Editor, and the above mentioned Mr. Moley.

Pierpont Morgan Library Collection

Exhibit Comprises Large Portion of the Extensive and Important Pierpont Morgan Library Collection 9th to 16th Century Specimens

THE Pierpont Morgan Library possesses the largest and most important collection of illuminated manuscripts in America. The present exhibition, arranged jointly by the Trustees of the two Libraries, affords an unusual opportunity of seeing some hundred and fifty of the treasures of this notable collection, and makes them available for the enjoyment and instruction of a wider public than The Pierpont Morgan Library has the room to receive.

The manuscripts exhibited, ranging from the 9th to the 16th century, have been selected primarily for the artistic or historical importance of the illuminations and miniatures. All of them are remarkable examples of the arts with which the Middle Ages enriched its most precious books, particularly the service books used by the Church. Many of them are more than museum pieces; they are of real importance for liturgiology or for the history of Christian art, and they are often consulted by scholars. Some of them are celebrated because they were made for kings and queens, or for great nobles or churchmen, whose patronage fostered the arts during these centuries. Liturgical and religious works naturally predominate, but the secular interests of the time are represented by perhaps fifteen manuscripts.

Each manuscript is a unique and individual work of art. The exhibition as a whole presents an epitome of the history of book painting from the crude pictures in the Coptic manuscripts of the 9th century to the decline of the art in the 16th century after the invention of printing.

The manuscripts have been grouped rather broadly, first by century, and then by country. The metal and jewelled bindings are displayed in the five cases in the centre of the room, with Morgan MS. number 1 (the "Ashburnham Gospels") occupying the place of honor at the end of the room opposite the entrance. Cases 6 to 23 containing, with a few exceptions, manuscripts from the 9th to the 12th century are in the south section of the room, the left on entering. Cases 24 to 41 containing the later manuscripts (13th to 16th century) are in the north (right) section of the room. The numbering on each side is from the front to the back of the exhibition room, and from left to right.

GUIDE TO THE EXHIBITION

Noting Manuscripts of Special Interest

METAL AND JEWELLED BINDINGS

9th to 16th Century

Case 1

The Four Gospels, Morgan MS. No. 1 variously known as the Lindau or Ashburnham Gospels, 9th century. Written and illuminated in the monastery of St. Gall, Switzerland. The lower cover, of pure Celtic design, was probably executed at St. Gall between 825 and 850. The upper cover (with the Crucifixion) was the product of the monastery of St. Denis in France.

Cases 2 to 5

In these cases are shown eleven MSS. and one jewelled cover (Case 3) of Spanish or Augsburg workmanship, executed for the Emperor Charles V. The following are of special interest. *Hours of the Virgin* (Case 3). Written and illuminated at Rome (finished in 1546) by Giulio Clovio for Cardinal Alessandro Farnese. The contemporary binding of silver and silver-gilt was probably the work of Manno, a pupil of Benvenuto Cellini. Two English MSS. of the 11th century, known as the "Judith Gospels," are displayed in Case 5 (above). The upper cover of the MS. on the right is ornamented with a gold plaque which is contemporary and a very early specimen of English or Flemish goldsmith's work. The cover of the other MS. was executed at the monastery of Weingarten in Bavaria in the 12th century. Below in this case are two *Missals* of the 13th century, both illuminated and bound at Weingarten. The "Berthold Missal" (right) is perhaps the masterpiece of the Weingarten school of illumination.

MANUSCRIPTS

9th to 12th Century

Carolingian and Ottonian

Case 6

Two MSS. (*Lectionary* and *Gospels*) of the 11th century written and illuminated in the monastery of St. Peter, near Salzburg, Austria. The *Gospels* (centre) is considered one of the earliest and finest MSS. of the Salzburg school. *Lectionary* executed in the monastery of St. Gall, Switzerland, in the 10th century.

Case 7

Three *Gospels,* French, of the 9th century. Of special interest are the Rheims MS. open to the miniature representing St. Mark, and the "Golden Latin Gospels of Henry VIII," in which the entire text is written in gold upon purple-dyed vellum. This MS. is traditionally said to have been given to Henry VIII of England by Pope Leo X.

Case 8

Two *Gospels,* the first, German of the 9th century, and the second, Flemish of the 11th century. A *Missal* written and illuminated in the abbey of Mont St. Michel, France, in the 11th century.

Case 9

Two *Gospels* of the 10th century, the first of Franco-Flemish workmanship, and the second, Flemish. Thirty full-page pictures, French, 12th century, representing scenes from the life of Christ, probably intended to be prefixed to a *Psalter.*

12th Century—*English*

Cases 10 and 11

The *Life, Miracles, and Passion of St. Edmund* (first MS. in Case 10), and the Bestiary (Case 11) are perhaps the most interesting in this group.

10th and 13th Centuries—*Spanish*

Cases 12 and 17

The two MSS. of the *Commentary on the Apocalypse,* by Beatus are of unusual interest. That displayed in Case 12, 10th century, is the earliest of the known Beatus MSS. Both script and miniatures are in the Mozarabic style. That in Case 17, 13th century, is one of the most richly illuminated Beatus MSS. known.

11th to 14th Century—*Italian*

Case 13

The first MS., a north Italian *Gospels* of the 11th century, is an interesting example of the untouched work of the draughtsman before the final stage of coloring had been reached. It was executed for the Countess Matilda of Tuscany for presentation to a monastery. The other two MSS. are a *Sacramentary* of the late 11th century, and a *Martyrology* executed at Monte Casino in the 12th Century.

Case 14

In the centre of the case is a volume of a 12th-century *Bible* of North Italian origin. Two *Bibles* of the 14th century are also shown.

Case 15

Three MSS. of the 14th century. The Dante was in the library of Ferdinand I, King of Naples and Sicily (1423-1494).

Case 16

A *Missal,* an interesting *Treatise on the Horse,* and a series of thirty-eight illuminations (centre) picturing scenes from the life of Christ, the work of an Umbrian artist, compose this group of 14th-century MSS.

9th to 16th Century—*Near Eastern*

Cases 18 and 19

In these two cases are shown four Coptic (Egypt) MSS. of the 9th and 10th centuries, and the original covers of one of them, a selection from the sixty-three Coptic MSS. owned by The Pierpont Morgan Library. This collection is of great importance for students of liturgiology and of early Christian art.

Case 20

De Materia Medica, by Dioscorides, a Greek MS. of the 10th century, and a 10th-century *Aesop,* in Greek, of South Italian origin are of special interest. The third MS. displayed is a *Lectionary,* in Greek, executed at Constantinople in the 11th century.

Case 21

The *Gospels,* in Greek (centre), a South Italian MS. of the 10th century, and two *Lectionaries,* both produced at Constantinople, one in the 11th-12th, the other in the 12th century. The latter one is unusual in that each page of the text is arranged in the form of a cross.

*By courtesy of the New York Public Library, in cooperation with the Pierpont Morgan Library.

CASE 22

Three Greek MSS. of the 13th century and a roll MS., in Greek (*Letter of Abgarus*), executed at Constantinople about 1300.

CASE 23

Two Armenian *Gospels*, one of the 13th, the other of the 15th-16th century, and a Syriac *Gospels* of the 13th. A leaf from a Syriac MS. of the 10th-12th century with a representation of St. Luke.

13TH CENTURY

CASE 24

Three French MSS. of the 13th century. The first, Scenes from the *Old Testament*, was presented to Shah Abbas the Great, of Persia, in 1604. He directed that the meaning of the pictures should be written in Persian under each one. The *Moralized Bible* consists of eight leaves from the *Biblia Rica* in the Treasury of the Cathedral of Toledo, Spain. The complete MS. contained nearly 5,000 circular miniatures, and may have been presented to the Cathedral by Louis IX, or by his mother, Blanche of Castile.

CASE 25

This group is composed of one volume of a Latin *Bible*, and four *Psalters*, all probably of Northeast French origin.

CASE 26

Five *Psalters* and *Books of Hours* of 13th-century Flemish workmanship.

CASE 27

Perhaps the most interesting of these five English MSS. of the 13th century is the so-called "Windmill Psalter," shown in the centre of the case. The earliest known representation of a windmill to be found in a book may be seen at the top of the large initial E on the right-hand page.

13TH AND 14TH CENTURIES

CASE 28

This case contains a *Missal*, two *Psalters*, one of which is the smallest early MS. in the exhibition, and a *Book of Hours*, all of 13th or 14th-century English workmanship.

CASE 29

This group of French MSS. of the 14th century comprises a *Histoire de la Bible*, by Herman de Valenciennes, an allegory by Guillaume de Deguilleville (both of these with fine miniatures in grisaille), a *Marco Polo*, and (lower centre) two *Books of Hours*, that on the left containing unusually fine miniatures in grisaille and color.

CASE 30

Here are shown a German *Lectionary* of the 13th century, a 12th-century *Psalter* of Swiss origin, and a rhymed world-chronicle, in German, executed in Bavaria in the 14th century.

15TH CENTURY

CASE 31

Three French MSS. of which the most interesting is probably an *Apocalypse* (centre), in French, from the library of Jean, duc de Berry (1340-1416).

CASE 32

The *Missal* (centre) is probably the finest of these three French MSS. of the 15th century. The *Book of Hours* (left) is similar in style to the celebrated Bedford Hours in the British Museum.

CASE 33

This group of 15th-century MSS. of French, Flemish, or Franco-Flemish origin, contains seven *Books of Hours*, one of which was executed for Anne de Bretagne, Queen of France, and an allegorical dialogue by Rene I, d'Anjou with charming miniatures. The "black" *Book of Hours* is of unusual interest. The entire text is written in silver.

CASE 34

Three Flemish MSS. of the 15th century, all large volumes, and by way of contrast one of the smallest complete illuminated MSS known (*Offices of the Virgin.*)

CASE 35

Four Italian MSS. of the 15th century. The first, by Cornazzano, contains a delightful portrait of Eleanor of Aragon, Duchess of Ferrara. The third, *De Spiritu Sancto*, by Didymus Alexandrinus, was executed for Matthias I, "Corvinus," King of Hungary.

CASE 36

Two *Missals*, two *Books of Hours*, and a work on jurisprudence comprise the five Italian MSS. of the 15th century shown in this case.

CASE 37

Four English MSS. of the 15th century.

CASE 38

The most interesting MS. is the Spanish *Missal* of the 15th century shown in the centre of the case. The other MSS. displayed are of 15th-century Dutch workmanship.

16TH CENTURY

CASE 39

This group consists of five French MSS. In the centre are three fine examples of "late" French *Books of Hours*. On the right is a *Book of Hours* illuminated by Jean Bourdichon. It is one of the best examples shown in the art of illumination in this period of its decline.

CASE 40

The most interesting example of late Flemish illumination shown is the *Breviary* in the centre of the case. The style of the decoration is closely related to that of the celebrated Grimani *Breviary at Venice*.

CASE 41

Four 16th-century MSS. are shown in this case, a *Missal* and a *Pontifical*, both Italian, and (centre) two *Books of Hours*, one Flemish, the other Spanish, made for the Emperor Charles V.

Various separate leaves and miniatures are displayed in the frames (numbered 42 to 49) placed against the east and west walls. All are Italian of the 14th century, with the exception of the two *Indulgences* (Avignon, 14th century) in Frame 42, and two English and one French leaf, all of the 14th century, shown in Frame 43.

India As A Market For Glassware

By WALTER BUCHLER

THERE is a very good demand for imported glass chimneys (No. 6 to 20 lines), selling from 2 annas to annas. These are used for burning kerosene oil as table, wall and hurricane lamps. There is a tremendous business done in imported bottles, the principal demand being in wine bottles (costing 36/-per gross in 24 oz. size), soda water bottles (22/-per gross 9 oz.), medicine bottles (2-18 oz. 40/-according to size and quality), lemonade bottles (8 oz. 36/-), flasks (10 and 12 ozs). Every where in India windows are today to be seen, the demand being, to a great extent, for fourth class 16 oz. per square foot window glass. Sizes suitable for this market are 8 x 8, 8 x 10 to 28 x 36, prices averaging six rupees C.I.F. Bombay per case of 100 square feet.

There is also scope for selling plate glass for use by stores (shop windows or show cases), 3/16 to 1/4 inch with packing 250 square feet to a case being suitable for this market. Price is, on an average, 4d per square foot C.I.F. Bombay. Most of the porcelain toys sold in India are imported, whilst the cheapest quality of wooden toys rather ugly in shape and painted by hand are made locally. Dolls and animals painted in different colors are popular. There is also a demand for porcelain insulators, the majority of which are imported. Some made in Calcutta on a small scale, are cheaper and are of fair quality.

During recent years there has been a growing tendency among the more Westernized and richer classes to go in for better class China and Glass. European residents and Parsees are the chief buyers of this type of merchandise. Many Indians wish to appear up-to-date and furnish their homes in a thoroughly modern style. This is also noticeable with Rajahs and Maharajahs, who get their supplies from the leading English department stores or establishments

specializing in China and Glass, paying very satisfactory prices. A large business is done also in wine glasses, plain and cut, the most popular size being 1/2 pint tumbler ('chota' peg—small peg). Readers will be interested to know that whiskey and soda is not, as a rule drunk in India in small wine glasses, but in ordinary glasses. A tremendous amount of liquor is consumed in India; among wine glasses, perhaps the most popular size is the Sherry glass used for mixed Vermouth. In China, small breakfast sets (choto hazri) are popular for morning tea, consisting of 2 cups and saucers, sugar and cream, teapot and small plate for toast. The demand for toilet services is decreasing on account of improved sanitary installations, such as porcelain basin and water laid on.

The Indian of today uses the same dishes as we do, perhaps he has a few more bowls, plates and finger bowls, but otherwise he models his home after Western styles.

Business is done through importers who send orders direct to manufacturers or to exporters overseas. New customers are generally asked to open credit through a reliable Bank, whilst established houses can get terms 30 to 60 days D/P.

Numerous foreign stores in the larger cities such as Bombay and Calcutta sell the better class of China and Glass, whilst the cheap grades are sold in the Bazaars. Competition there is keen and the Indian is ever ready to cut prices for the sake of getting the business. In fact, in this market, there is no such thing as a fixed price in any article or commodity.

The Thirty-sixth Annual Convention of the American Ceramic Society

In Cincinnati on February 11-16, 1934.

CINCINNATI abounds in ceramic art. There is famous old Rookwood Pottery and the Art Museum with its reknowned collection of glass, porcelain, pottery and paintings. The Taft Museum has its Chinese porcelains, its French enamels, and Italian majolica. The new railroad terminal unforgettably demonstrates its fine use of terra cotta and its colorful *mosaics*. In addition there are many interesting industries producing decalcomanias, decorated glass objects, stained glass windows, and enameled metals.

Part of Thursday, February 15, will be devoted to visiting these objects of interest in Cincinnati. Other ceramists may desire to join the excursion to the huge plant of the American Rolling Mill Company at Middletown, Ohio, where enameling iron is rolled on continuous mills. This party will continue to the great Frigidaire plant at Dayton, an objective educational tour in itself. On the return trip, if time permits, this party may catch a glimpse of a porcelain enameled frameless steel house which The American Rolling Mill Company recently erected near Middletown.

Next day, Friday, February 16, a group will leave for Louisville to visit the American Medicinal Spirits Company, which in view of the repeal of the 18th Amendment should prove a most popular tour. The Standard Sanitary Manufacturing Company has extended an invitation to ceramists to inspect its plant, as has the Louisville Pottery Company and the Louisville Enameled Products Company. The Corhart Refractories Company will welcome the visitors and show them how to fuse aluminous materials to produce refractories for the manufacture of glasshouse blocks and shapes.

The following are some of the papers which are to be presented at the meeting:

Opaque Zirconium Enamels and the Possibilities for Their Application in Glass, Glazing, and Enameling Industries, by C. J. Kinzie and C. H. Commons, Titanium Alloy Research Laboratories, Niagara Falls, N. Y.

Zirconium Compounds as Opacifiers in Enamels and Glass, by C. J. Kinzie and J. A. Plunkett of same company as above.

Artistic Glass from 1900 *to the Present Day,* by Frederick Carder, art director, Corning Glass Works, Corning, N. Y.

Methods of Determining the Constitution of Glasses, by W. E. S. Turner and Eric Preston, Sheffield, England.

Recent Studies of the Fundamental Processes Underlying Glassmelting, by W. E. S. Turner, Sheffield, England.

Feldspar Analysis, by G. E. F. Lundell, Bureau of Standards, Washington, D. C.

Recent Equipment for Automatic Control in the Glass Industry by E. E. Warner, General Electric Company, Schenectady, N. Y.

Flame Working of Glass by W. T. Levitt, Corning Glass Works, Corning, N. Y.

Viscosity Measurements, by Hunter, U. E. Bowes, Owens-Illinois Glass Company, Alton, Ill.

Some Aspects of Glass Annealing-Influence of Heat Treatment on Diffusion Properties and Color of Glass, by H. H. Blau, Macbeth-Evans Glass Company, Charleroi, Pa.

Laminated Glass or Double Glazing and Tank Melting of Glass, by J. Gregorius and R. A. Miller, Pittsburgh Plate Glass Company, Pittsburgh, Pa.

Chemicals for Accelerating Glassmelting by R. M. Curtis, 233 Broadway, New York.

Phase-Rule Studies on Glasses Containing Barium by G. W. Morey, Geophysical Laboratory, Washington, D. C.

Constitution of Glass, by F. W. Preston, Butler, Pa.

Fusible Enamels and Lusters for Coloring and Decorating Glass, by W. E. Dougherty, O. Hommel Company, Pittsburgh, Pa.

Soda, Boric Oxide, Silica Glasses, by S. R. Scholes, Alfred University, Alfred, N. Y.

Crystals, Solids, Glasses, and Liquids, by R. B. Sosman.

Methods of Inducing Crystallization, by E. W. Washburn.

Identification of Crystalline Substances by Means of the Petrographic Microscope, by T. N. McVay.

Identification of Crystalline Substances by Means of X-Ray by B. D. Warren.

Effect of Reheating on the P.C.E. of Refractories by S. S. Cole.

Distribution of the Chief Refractory Clay Deposits of the United States, by J. R. Chelikowsky.

Disintegration of Refractories in Various Special Atmospheres, I. Hydrogen, II. Cracked Natural Gas, by F. A. Harvey.

Approximate Composition of the Lowest Fusing Mixture of Barium Oxide, Magnesium Oxide, and Silica, by Cecil H. Turner.

Thermal Conductivity of Silicon Carbide, by Gordon B. Wilkes.

Olivine as a Refractory, by R. A. Heindl, Bureau of Standards, Washington, D. C.

Glass Problems in Radio Tube Manufacture, by Henry J. Miller, Radio Corporation, Newark, N. J.

Glass Surfaces, by Professor Hawkins, University of Chicago, Chicago, Ill.

Those who attend the Thirty-sixth Annual Convention of the American Ceramic Society in Cincinnati may obtain *reduced railroad fares* according to an announcement by R. C. Purdy, general secretary of the Society. The round trip rate amounts to *one and one-third the normal one-way fare.* Tickets must be purchased between the dates of *February* 8 *to* 14. Buy a one-way ticket to Cincinnati. Ask the agent to give you a convention concession certificate. At the convention have this form certified.

NOTE: The agent will charge only one-third the regular rate for return trip.

The Real Utility of the Declaration of Independence

In the new Archives Building of the Government of these United States, the original Declaration of Independence and the Constitution of the U. S. A. will be kept under Actinic glass, manufactured by the Pennsylvania Wire Glass Company to the specifications of Mr. L. T. Sherwood, their renowned Quaker technologist.

We have often wondered whether some good use would ever be found for these famous documents. Up to date they have produced nothing but trouble; wars, revolutions, secessions, and altogether unnecessary Presidential elections by the one; an endless string of amendments and cumbersome and protracted repeals of amendments by the other. There is no doubt that both documents were colossal historic blunders, but if they are now going to boost the use of Actinic glass, we hope that everybody will declare independences and write constitutions. Evidently they have some good points.

F. W. P.

Correspondence

Mr. F. W. Preston
Glass Industry
New York
Dear Sir,

I have read your answer to the Mr. Blenko's letter in the No. 10 of THE GLASS INDUSTRY.

As Frenchman and technical man I have been peculiarly astonished when reading the Mr. Blenko's letter concerning Le Verrier au XIXe Siecle. I have seen how highly the book had been praised.

This Flamm's book is almost unknown in France and I have never heard a glassmaker alluding to its existence. I was believing at the first view, it was a practical joke but, before laughing, I thought necessary to make acquaintance with that marvellous book.

Le Verrier au XIXe Siecle is scarce and it is difficult to find it. Fortunately one exemplar can be found in the library of Conservatoire National des Arts et Metiers.

The original book has been printed in 1860 at Nancy and a reprint has been issued at Paris in 1863.

I have read the reprinted book and I am sorry because I do not agree with Mr. Blenko's opinion.

This book covers well every phase of glassmaking. Pierre Flamm is the only writer I have met who seems to combine the scientific and the practical. All others works I have seen seem to be the work of scientists without practical knowledge or of practical (very crude affairs) without science. His work stands alone in this respect.

If Mr. Flamm had a grand-grand-daughter of whom Mr. Blenko would be the suitor I could understand his enthusiastic appreciation but it is not certainly the case and I am obliged to see the matter more calmly.

Le Verrier au XIXe Siecle is badly printed and the figures are skizzed. It contains a description of the glassmaking and many formulae but, without the mildest of unfriendly disposition, I am totally unable to discern a bit of scientific matter in the book. At this time many scientists had soon discussed the nature of the glass but Flamm is not interested with the question.

Later in 1868 Bontemps published *The Guide Du Verrier.* This last book is only five years younger but the matter is more largely broader. The comparison with the former is, if I am not mistaken, advantageous for Bontemps. His book is a technical one but Flamm's book is too only technical.

If you can not procure Le Verrier au XIX siecle you can sleep well. I recognize the value of the Verrier au XIX siecle but it is not a scientific book.

Yours truly

Paris, Dec. 16, 1933 O. GRANGER

PRODUCTION MANAGER

Wanted: A position as factory or production manager in a bottle factory by a man who knows how to get results. Address "Classified J1".

Current Prices of Glass-Making Materials

as of December 28, 1933.

Quotations furnished by various producers, manufacturers and dealers

Acid		Carlots	Less Carlots
Citric (dom.)	lb.	...	.29
Hydrochloric (HCl) 20° tanks	Per 100 lb.	...	1.10
Hydrofluoric (HF) 60% (lead carboy)	lb.	...	.13½
52% and 48%	lb.	.10	.10-.11½
Nitric (HNO_3) 38° carboy ext.	Per 100 lb.	5.50	...
Sulphuric (H_2SO_4) 66° tank cars	ton	15.50	...
Tartaric	lb.	... Po. or Gr. .25 / Cry. .25½	
Alcohol, denatured	gal.	...	...
Aluminum hydrate ($Al(OH)_3$)	lb.	.04-.04½	.04½-.05
Aluminum oxide (Al_2O_3)	lb.	.07	.09
Ammonium bifluoride (NH_4FHF)	lb.	...	13¼
Ammonia water (NH_4OH) 26° drums	lb.	...	.02¾
Antimony, metallic (Sb)	lb.	.02½	.02¾
Antimony oxide (Sb_2O_3)	lb.	.08	.08½
Antimony sulphide (Sb_2S_3)	lb.	...	.08½
Arsenic trioxide (As_2O_3) (dense white) 99%	lb.	.04	.04½
Barium carbonate ($BaCO_3$), Crude, (Witherite) 90%, 99% through 200 mesh	ton	56.50	61.50
90% through 100 mesh	ton	44.00	...
Barium hydrate ($Ba(OH)_2$)	lb.	...	.05¾
Barium mixture, glassmaker's, f. o. b. St. Louis	ton	25.00	...
Barium nitrate ($Ba(NO_3)_2$)	lb.	...	.08¼
Barium selenite ($BaSeO_3$)	lb.	...	...
Barium sulphate, in bags	ton	19.00	24.00
Barium sulphate, glassmaker's, carlots, bulk f. o. b. shipping point	ton	15.00-16.00	18.00
Bone ash, carlots	lb.	.06	.06½
Borax ($Na_2B_4O_7{\cdot}10H_2O$)	lb.	...	...
Granulated	In bags, lb.	.02	.02¼-.02½
Powdered	In bags, lb.	.02¼	.02½-.02¾
Boric acid (H_3BO_3)	In bags, lb.	.04¼	.04½-.04¾
Cadmium sulphide (CdS)—			
Red	lb.	...	.75-.85
Orange	lb.	...	.70-.75
Yellow	lb.	...	1.30-1.50
Chromium oxide (Cr_2O_3)	lb.	...	.22
Cobalt oxide (Co_2O_3)			
In bbls.	lb	..	1.25
In 10 lb. tins	lb.	...	1.35
Copper oxide			
Red (Cu_2O)	lb.	...	.25
Black (CuO)	lb.	...	.17-.19
Black prepared	lb.	...	.22
Cryolite (Na_3AlF_6) Natural Greenland (Kryolith)	lb.	.08½	.09
Synthetic (Artificial)	lb.	...	.08
Epsom salts ($MgSO_4$) (imported) technical	Per 100 lb.	...	2.40
Feldspar—			
40 mesh	ton	10.00-11.50	
20 mesh	ton	10.00-11.50	
Granular	ton	10.00-12.00	
Semi-granular	ton	10.00-11.50	
L. C. L., (Min. 2 tons) $2.00 per ton additional plus charge for bags			
Fluorspar (CaF_2) domestic, ground, 96-98% (max SiO_2 2½%)			
Bulk, carloads, f. o. b. mines	ton	30.00	...
In bags or barrels	ton	34.00	39.00
Imported	ton		
Formaldehyde	lb.	...	.07
Graphite (C)	lb.	...	.04-.07
Iron oxide—			
Red (Fe_2O_3)	lb.	...	.0425
Black (FeO)	lb.	.04½	...
Kaolin (f. o. b. mine)	ton	8.00-9.00	...
English, lump, f. o. b. New York	ton	14.50-25.00	24.50-30.00

Kryolith (see Cryolite)		Carlots	Less Carlots
Lead chromate ($PbCrO_4$)	lb.	...	.30
Lead oxide (Pb_3O_4) (red lead)	lb.	.0665	.0775
Litharge (PbO)	lb.	.0565	.0675
Lime—			
Hydrated ($Ca(OH)_2$) (in paper sacks)	ton	10.50	...
Burnt (CaO) ground, in bulk	ton	7.00	...
Burnt, ground, in paper sacks	ton	9.00	...
Burnt, ground, in 280 lb. bbls.	Per bbl.	2.15	2.30
Limestone ($CaCO_3$)		1.50-2.50	...
Magnesia (MgO)—			
Calcined, heavy (in bbls)	lb.	.06	.07
light (in bbls)	lb.	...	.23
extra light (in bbls.)	lb.	...	.37
Magnesium carbonate ($MgCO_3$)	lb.	.06	.10
Manganese 85% (MnO_2)	lb.	57.50	62.50
Nickel oxide (Ni_2O_3), black— for nickel content	lb.	...	.35
Nickel monoxide (NiO), green— for nickel content	lb.	...	.35
Plaster of Paris, bags	ton	31.00	23.00-29.00
Potassium bichromate ($K_2Cr_2O_7$)—			
Crystals	lb.	.08¼	.08⅝
Powdered	lb.	.08⅜	.09⅛
Potassium carbonate	lb.	.0825	.0875
Calcined (K_2CO_3) 96-98%	lb.		
Hydrated 80-85%	lb.	.07¼	.0775
Potassium chromate (K_2CrO_4)	lb.	...	.14¼
Potassium hydrate (KOH) (caustic potash)	lb.	.07½	.09
Potassium nitrate (KNO_3) (gran.)	lb.	...	.06-.06¼
Potassium permanganate ($KMnO_4$)	lb.	.17½	.18
Powdered blue	lb.	...	.23
Rochelle salts, bbls	lb.	...	.12½
Rouge	lb.	... Po. or Gr. / Cry.	.13½
Rutile (TiO_2) powdered, 95%	lb.	.15-.20	.20-.25
Salt cake, glassmakers (Na_2SO_4)	ton	18.00	...
Selenium (Se)	lb.	...	1.80
Silver nitrate (AgNO)	(100 oz.) per oz.	...	.31
Soda ash (Na_2CO_3) dense, 58%—			
Bulk	Flat Per 100 lb.	1.10	...
In barrels	Per 100 lb.	1.50	...
In bags	Per 100 lb.	1.25	...
Sodium bichromate ($Na_2Cr_2O_7$)	lb.	.06⅛	.06⅝
Sodium hydrate (NaOH) (caustic soda) Solid	Per 100 lb.	2.60	...
Sodium nitrate ($NaNO_3$)—			
Refined (gran.) in bbls	lb.	...	3.62
95 per cent	Per 100 lb.	1.195-1.295	1.245-1.345
Sodium selenite (Na_2SeO_3)	lb.	...	2.00
Sodium fluosilicate (Na_2SiF_6)	lb.	.04½	.05-.06
Sodium uranate (Na_2UO_4) Yellow or Orange	lb.	...	1.50-1.55
Sulphur (S)—			
Flowers, in bbls	Per 100 lb.	3.45	3.70-4.05
Flowers, in bags	Per 100 lb.	3.10	3.35-3.65
Flour, heavy, in bbls	Per 100 lb.	2.85	3.20-3.45
Tin chloride ($SnCl_2$) (crystals)	lb.	.38	.38½
Tin oxide (SnO_2) in bbls.	lb.	...	.58
Uranium oxide (UO_2) (black, 96% U_3O_8) 100 lb. lots. Black	lb.	...	2.75
Yellow orange	lb.	...	1.50
Zinc oxide (ZnO)	lb.	.08½	.12
American process, Bags	lb.	.05¾	.06
Zircon			
Granular (Milled .005-.02c higher)		.07	.67½-.08
Crude, Gran. (Milled .005-.02c higher)		.03½	.04-.05